

Amendments to the Claims

Claims 1-19 (Canceled)

Claim 20 (Currently Amended) An optical transmission apparatus for transmitting an optical signal via an optical fiber to a radio base station which photoelectrically converts the optical signal into a radio signal having a predetermined frequency and transmits the radio signal to a subscriber terminal, the optical transmission apparatus comprising:

an electrical-optical converter operable to convert an intermediate frequency signal into an optical signal by intensity-modulation;

a local oscillation signal generator-source operable to output a local oscillation signal; and

an external modulator operable to suppress a light frequency modulation component of the optical signal generated when said electrical-optical converter converts the intermediate frequency signal into the optical signal and intensity-modulate the optical signal using the local oscillation signal to produce an intensity-modulated optical signal, wherein

an intensity-modulation component of the intensity modulated optical signal has a frequency component of the radio signal.

Claim 21 (Previously Presented) The optical transmission apparatus according to claim 20, wherein

said electrical-optical converter is operable to convert a plurality of intermediate frequency signals into the optical signal by intensity-modulation.

Claim 22 (Previously Presented) The optical transmission apparatus according to claim 20, wherein

said external modulator is a Mach-Zehnder type external modulator, and a bias point in said Mach-Zehnder type external modulator is set to a point at which light output power is a minimum or a maximum so that the optical signal is intensity-modulated by a component which is twice a frequency of the local oscillation signal.

Claim 23 (Previously Presented) The optical transmission apparatus according to claim 20, wherein

 said electrical-optical converter is a semiconductor laser for converting the intermediate frequency signal into an electrical-optical converted optical signal through direct modulation.

Claim 24 (New) The optical transmission apparatus according to claim 20, wherein

 said electrical-optical converter includes:

 a three-branching portion operable to branch the intermediate frequency signal into first and second electric signals which are the same in phase and a third electric signal which has a phase difference of 90° from the first and second electric signals;

 an electrical-optical conversion portion operable to convert the third electric signal into the optical signal;

 a first delay control portion operable to adjust a propagation time of the first electric signal; and

 a second delay control portion operable to adjust a propagation time of the second electric signal,

 said local oscillation signal generator includes:

 a local oscillation signal source operable to output the local oscillation signal;

 a two-branching portion operable to branch the local oscillation signal into first and second local oscillation signals which are opposite in phase;

 a third delay control portion operable to adjust a propagation time of the first local oscillation signal; and

 a fourth delay control portion operable to adjust a propagation time of the second local oscillation signal,

 said external modulator includes:

 a first multiplexing portion operable to multiplex the first electric signal outputted from said first delay control portion and the first local oscillation signal outputted from said third delay control portion;

 a second multiplexing portion operable to multiplex the second electric signal outputted from said second delay control portion and the second local oscillation signal outputted from said fourth delay control portion; and

a differential intensity modulator, having first and second electrodes, operable to modulate the optical signal outputted from said electrical-optical conversion portion by respectively inputting signals obtained by the multiplexing in said first and second multiplexing portions to said first and second electrodes, and

said first, second, third and fourth delay control portions are adapted such that the first and second electric signals inputted to said first and second electrodes of said differential intensity modulator through said first and second multiplexing portions are the same in phase, to subject the optical signal outputted from said electrical-optical conversion portion to phase modulation and subject the optical signal to optical modulation which is the same in amount and opposite in phase to a frequency deviation (an FM index) of the light frequency modulation component of the optical signal.

Claim 25 (New) The optical transmission apparatus according to claim 20, wherein
said electrical-optical converter includes:

a three-branching portion operable to branch the intermediate frequency signal into first and second electric signals which are the same in phase and a third electric signal which has a phase difference of 90° from the first and second electric signals;

an electrical-optical conversion portion operable to convert the third electric signal into the optical signal;

a first delay control portion operable to adjust a propagation time of the first electric signal; and

a second delay control portion operable to adjust a propagation time of the second electric signal,

said local oscillation signal generator includes:

a local oscillation signal source operable to output the local oscillation signal;

a two-branching portion operable to branch the local oscillation signal into first and second local oscillation signals which have a difference of 90° with respect to each other;

a third delay control portion operable to adjust a propagation time of the first local oscillation signal; and

a fourth delay control portion operable to adjust a propagation time of the second local oscillation signal,

said external modulator includes:

a first multiplexing portion operable to multiplex the first electric signal outputted from said first delay control portion and the first local oscillation signal outputted from said third delay control portion;

a second multiplexing portion operable to multiplex the second electric signal outputted from said second delay control portion and the second local oscillation signal outputted from said fourth delay control portion; and

a differential intensity modulator, having first and second electrodes, operable to modulate the optical signal outputted from said electrical-optical conversion portion by respectively inputting signals obtained by the multiplexing in said first and second multiplexing portions to said first and second electrodes,

said first and second delay control portions are adapted such that a phase difference between the first and second electric signals inputted to said first and second electrodes of said differential intensity modulator through said first and second multiplexing portions is zero, to subject the optical signal outputted from said electrical-optical conversion portion to phase modulation and subject the optical signal to optical modulation which is the same in amount and opposite in phase to a frequency deviation (an FM index) of the light frequency modulation component of the optical signal, and

said third and fourth delay control portions are adapted such that the first and second local oscillation signals inputted to said first and second electrodes of said differential intensity modulator through said first and second multiplexing portions have a difference of 90° with respect to each other, to subject the optical signal to optical single side-band modulation with a light carrier.

Claim 26 (New) The optical transmission apparatus according to claim 20, wherein

said electrical-optical converter includes:

a two-branching portion operable to branch the intermediate frequency signal into first and second electric signals which have a phase difference of 90° with respect to each other;

an electrical-optical conversion portion operable to convert the first electric signal into the optical signal; and

a delay control portion operable to adjust a propagation time of the second electric signal;

said external modulator includes an integrated modulation portion, having a phase modulation portion and an intensity modulation portion formed on a same substrate, operable to modulate the optical signal outputted from said electrical-optical conversion portion, said phase modulation portion operable to receive the second electric signal outputted from said delay control portion and said intensity modulation portion operable to receive the local oscillation signal, and

said phase modulation portion is operable to subject the optical signal outputted from said electrical-optical conversion portion to phase modulation and optical modulation which is opposite in phase to a frequency deviation (an FM index) of the light frequency modulation component of the optical signal.